PLAN AND SECTION OF DRY AREA.

Fig. 1

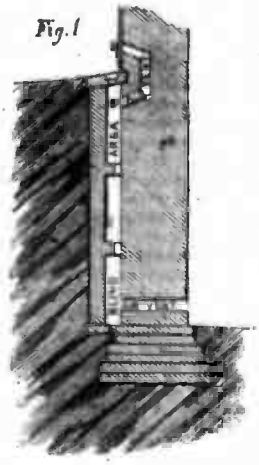
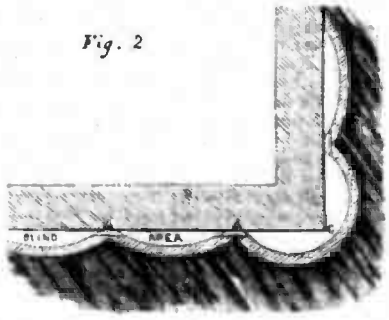


Fig. 2



soil tends to penetrate, in one direction or another, the hygrometric bodies with which it meets. It hence results, that the walls of buildings will absorb from the soil a certain dose of humidity at all the points immediately in contact with it. That is to say, if there be an underground basement, the outside walls will absorb by their footings, and by one of their faces, and the division walls by the footings alone. If there be no underground basement, the division and outer walls will be under precisely the same conditions, with respect to those parts of them below the level of the exterior surface of the soil. But are these the only causes of humidity ordinarily regarded in the lower parts of buildings? Certainly not; and it is easy to prove that, with regard to external walls, there are other causes, which, although less constant, are notwithstanding not less immediate;—we mean the rain-water, which the wind drives upon the faces of walls, by which the lower part is wetted; as well by that driven directly on the surface as by that which rebounds from the ground, or by that which falls down the face of the wall. In the case of dripping eaves, without gutters, it may be easily imagined the abundance of wet which the walls receive at the lower parts from the drips of water, and from stacks of rain-water pipes without shoes.

We may therefore consider it to be sufficiently proved that, in ordinary construction, damp enters the lower parts of buildings—1st, by the footings; 2ndly, by the walls, the faces of which are in direct contact with the soil; 3dly, by the faces of the walls exposed to rain, and the humidity of the atmosphere. It is to be understood, that the influence of these different causes operates in proportion to the nature of the soil, of the aspect of the building, of the nature of the materials employed in the construction, of the different modes of construction, and, lastly, of all the peculiar conditions to which the buildings in question may be subject.

If the lower floor of a building be covered, whether it be by any pavement whatever, or by a planking, immediately upon the soil itself, it is certain that the ground under the floor contains, first its own humidity, as also the damp which traverses the foundations of the outer walls; so that there will exist always a constant humidity throughout the whole extent of the *lowermost* floor, susceptible of exercising its influence upon all bodies immediately in contact with the surface of the soil. It has frequently been thought that, in order to diminish this influence, it was sufficient to raise the level of the lowermost floor to a certain height above the height of ground outside, if the entrance floor be the lowermost one. But these means are not so thoroughly efficacious as when there is a basement beneath, or a complete isolation under the floor, by which a thorough ventilation may be produced. And the lower parts of the external walls, the most exposed to the action of the rain, being thus below the inner surface, or floor, they cannot so easily transmit within the building the humidity which will have penetrated the exterior walls. We shall see, however, that these arrangements are still insufficient. We shall therefore lay down, in the first place, that unless there be precautions taken, the floor of the entrance story of every building placed on the level of the soil outside, and directly upon the soil inside, will take up constantly a degree of humidity. In the second place, if the level of the floor inside, be higher than the outside soil, but if it be placed directly upon the ground within the building, it will preserve very nearly the same chance of damp as in the former case, all other circumstances being alike. Thirdly, that the likelihood of humidity will be diminished, if the floor inside be placed above a basement story. And fourthly, that they will be diminished, although not necessarily impossible, if the floor be above a sub-basement, and also higher than the soil outside.

But, it must be added, that all these causes depend upon the peculiar conditions to which any buildings may be subject, and which it would be very difficult and too tedious to specify in all their detail.

The first great element of consideration is the nature of the soil; it will be at once obvious that the current of spring water will be at a higher or lower level in proportion as a building may be more or less above the level of a river, as the soils may vary in quality and are rocky, clayey, or sandy, and consequently more or less permeable, and thereby more or less accessible to water.

We need not dwell on the influences of climate, as they are too fully recognised to be disputed; but the various influences which result from the aspects of the fronts of a building, deserve consideration. The façades exposed to the west and north are injuriously affected by the temperature; whilst upon the other sides, these influences are less experienced and are counteracted by the effects of the sun.

The paving the outer surface next the building, or its being unpaved, materially affects the dryness of the inside; and the construction of numerous and full sized sewers and drains in large towns, also carries off a great portion of the surface waters; and again, an isolated building is more exposed than one contiguous to another; and also when a house is on the slope of a hill, with one part against a bank, through which the waters may flow, it is necessary to adopt precautions to prevent their penetrating the solid constructions.

No reliance can be placed on the impenetrability by humidity, of any material—wood, bricks, ordinary stones of every quality, marble, nay granite itself, are more or less hygrometric—that is to say, that plunged in water or kept in a humid atmosphere, after having been previously weighed in their dry state, there is no one which will not have acquired some addition of weight. Thus, if the base of a column be immersed in water, it will gradually rise up the shaft, and the damp never quits a body into which it has once penetrated, unless it be absorbed by the air or heat. If the upper part be dried by exposure, as soon as it ceases to be acted upon, the humidity of the lower portion will again rise to the dry part.

A wall, therefore, constructed of brick or stone of any quality whatever, will be subject to the damp which exists in the soil, and which will enter in all directions and in all parts, where the wall is in immediate contact with the ground. The extent to which this damp will penetrate, cannot be determined, and it may rise to a very great height above the level of the soil; and if it be arrested more or less, that will be caused by the influence of the neutralising power of the temperature of the atmosphere; so that a wall, which may be very damp at the beginning of summer, will be much less so at the end of the dry season, and particularly so if immediately exposed to the sun, but the following winter the damp will return, unless the original causes of humidity be subdued.

The Inconveniences of Damp.

1. Unhealthiness. 2. The destruction of all perishable objects within its reach. And 3. the gradual deterioration of the structural parts of the building. On the outer faces, the action of wet commences by the joints, the mortar generally being more penetrable than the stones which it unites, hence it decays, the joint gets gradually freed of the mortar, and the damp, from the very nature of the cavity, comes in greater abundance, undergoes all the alternations of heat, cold, and frost, gradually decomposing the stone with which it is in contact. The wet then generates vegetation, another active agent of destruction.

Some persons have imagined it a sufficient remedy to render, or cover, the inside of a damp wall with a strong cement; but such an application is worse than useless; for it not only prevents a wall from becoming dried by the action of the air on the surface, and thus retains the damp in the body of the wall, but the wall, once thoroughly saturated, and acted upon by damp from one side or from the footings, will throw off any coating upon the face opposite to that on which the wet enters. To a certain degree, the entrance of wet may be arrested by coating the *outer* face of the wall with a strong cement, but there is no fully effectual obstruction to damp, but an open space through which the air may freely circulate. Hence the evil must be taken at its very source and origin, and the first access of wet to the wall must be prevented.

We will then begin with the foundations. It is desirable in all and every class of soil, to have a substratum of concrete under the foot-

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